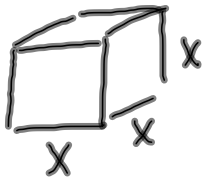
31. related rates given 1 rate, find another rate



$\frac{dx}{dt} = .2 \frac{cm}{sec}$ find $\frac{dV}{dt}$ ↑ in terms of SA

$V = x^3$ $SA = 6x^2$

$\frac{dV}{dt} = 3x^2 \cdot \frac{dx}{dt}$ $x^2 = \frac{SA}{6}$

$= 3x^2(.2)$

$= .6x^2 = .6\frac{SA}{6} = .1 \cdot SA$

Mar 9-7:35 AM

33. $f'(x) = \boxed{\frac{\sin^2 x}{x} - \frac{2}{9} = 0}$ critical (0, 10)

2 c.p.

$f' = 0$

$f' = \nexists$

35. same $\begin{cases} F'(x) = f(x) \\ \int f(x)\,dx = F(x) \end{cases}$

$\int f(3x)\,dx = \frac{1}{3}F(3x)$

$\int_{-1}^{2} f(3x)\,dx = \frac{1}{3}F(3x)\Big|_{-1}^{2}$

$= \frac{1}{3}[F(6) - F(-3)]$

$F'(3x) = f(3x) \cdot 3$

Mar 9-8:00 AM

38. $\frac{1}{2}[b_1+b_2]h$ $\frac{h}{2}[y_0+2y_1+2y_2 \cdots y_n]$

$[1,3]$ $h=2$ $\frac{2}{2}[15+25]$

$[3,6]$ $h=3$ $\frac{3}{2}[25+40]$

$[6,9]$ $h=3$ $\frac{3}{2}[40+30]$

+

Mar 9-8:10 AM

41. $F(x)=\int \frac{2(\ln x)^4}{3x}\,dx$ $F(2)=0$

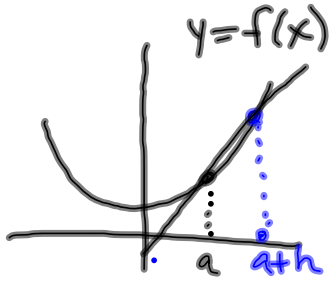
$F(8)=?$

$F(8)-F(2) = \int_2^8 \frac{2(\ln x)^4}{3x}\,dx + F(2)$

$$F(x)=\int_a^x f(t)\,dt + F(a)$$

Mar 9-8:13 AM

Review 6 Der at a point, local linearity



slope at $x=a$

derivative at $x=a$

$b=a+h$

formal definition of the derivative

$$f'(a) = \begin{cases} \lim_{h\to 0} \dfrac{f(a+h)-f(a)}{h} \\ \text{same} \quad \lim_{b\to a} \dfrac{f(b)-f(a)}{b-a} \end{cases}$$

Mar 9-8:19 AM

$f(x)=x^2+3$ slope at $x=3$

use the definition of slope (deriv.)

$$\lim_{h\to 0} \frac{f(3+h)-f(3)}{h}$$

$$\lim_{h\to 0} \frac{(3+h)^2+3-(3^2+3)}{h}$$

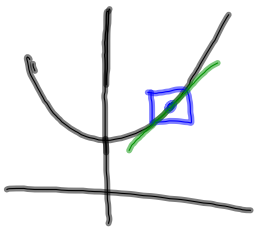
$$\lim_{h\to 0} \frac{9+6h+h^2+3-12}{h} = \lim_{h\to 0} \frac{6h+h^2}{h}$$

slope of ten line $=6$

$$\lim_{h\to 0} \frac{h(6+h)}{h} = 6$$

Mar 9-8:26 AM

local linearity: as you zoom in on a differentiable function, it looks like the tangent line



find the equation of the tan line at $x=3$

$f(x)=x^2+3$

slope $=6$

$y=m(x-x_1)+y_1$

$y=6(x-3)+12$

$y=6x-6$

Mar 9-8:31 AM